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Motivational Interviewing, and Healthy Eating Intervention with Low Income Diabetic Patients

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Abstract

Purpose: The project's aim was to investigate whether motivational interviewing made a difference for the participants in terms of healthy behaviors, as measured by their weight, BMI, HgA1C and total health eating habits score.

Method: A motivational interviewing intervention was used on thirteen diabetic patients in three monthly group meetings and weekly phone calls surrounding healthy eating. The health behaviors such as improving dietary choices, decreasing sedentary behaviors, and increasing habitual physical activity and exercises were assessed at both pre and post intervention as well as weight, body mass index (BMI), Hemoglobin A1c, and healthy eating habits total score.

Results: Four independent samples t-tests were employed to determine if the motivational interview intervention had any effect on the weight, BMI, HgA1c and healthy eating habits total score for the thirteen participants enrolled in the study. No statistically significant difference was found in terms of fast food eating, location of food shopping and daily meals between pre and post intervention. However there was a statistically significant difference with regards to fruits and vegetable eating, $Z = -2.233$, $p = 0.026$. There was a statistically significant difference in the mean rank weight post intervention versus the mean rank pre intervention, and in the mean rank BMI post intervention versus the mean rank pre intervention, $Z = -2.132$, $p = 0.033$.

Conclusion: Motivational interviewing is an important intervention as illustrated by this project to affect behavioral changes. This intervention had an effect on the weight and BMI scores, but not on the HgA1C and health eating habits total score. The effects of motivational interviewing may have lasting effects on the participants and the results may be more evident in the long run.

Keywords: Obesity, low income, food insecurity and Motivational interview

Introduction and Background

Worldwide, food insecurity affects approximately one billion people, resulting in food deprivation, hunger, and malnutrition (Food and Agriculture Organization of the United Nations, 2012). According to Coleman-Jensen, Gregory and Singh (2014), food insecurity is the state of being without reliable access to a sufficient quantity of affordable and nutritious food limited by lack of money and other resources. Risk factors for food insecurity include any factors that negatively affect household resources and the percentage of those resources available for food acquisition. Potential consequences of food insecurity include hunger, malnutrition and (either directly or indirectly) negative effects on health and quality of life. Food insecurity may also lead people to eat whatever is available and this may lead to obesity. In the United States, more than a third of adults are obese, with precise rates varying by region and state (Centers for Disease Control [CDC], 2012).

Obesity risk related to food insecurity remains high even when food insecure individuals or households participate in formal emergency and supplementary food assistance programs, or informally obtain supplemental sources of food (Walker & Kawachi, 2012). Obesity in adulthood is an underlying cause, environmental trigger, or exacerbating factor for a litany of clinical sequelae including cardio-metabolic disease, type 2 diabetes, cancer, hypertension, dyslipidemia, stroke, liver and gallbladder disease, sleep apnea and respiratory disease, osteoarthritis, gynecological problems, and endocrine disorders (CDC, 2010). It is therefore important to educate primary care providers and patients on this very important problem of obesity and its associated complications so that an adequate and sustainable solution can be implemented.

The topic of food insecurity and diabetes is explored in the article, “Clinical Management of Food-Insecure Individuals with Diabetes” by Lopez and Seligman (2012). In the article, 14% of the American population is food insecure. Out of that number many are at a high risk of diabetes because they eat only what is available which usually is unhealthy food. The increase in food prices from 2002-2012 including fresh fruits and vegetables, which are needed for healthy living could be the cause of people eating more unhealthy food. As a result, the researchers suggest referring food-insecure families to available resources. One of those resources includes Supplemental Nutrition Assistants Program (SNAP), for women, infants and children (Lopez & Seligman, 2012). The Women, Infants and Children (WIC) program is popular in the United States with a goal to make sure children are exposed to healthy fruits, vegetables, and other foods that are considered healthier forms of eating.

Obesity has been known to be associated with high calorie food intake and sedentary life style. Many studies have supported this by showing that people who followed healthy diets including fruits and vegetables along with physical activity recommendations were successful in reducing body mass index (BMI), (Ahn et al., 2014; Resnicow et al., 2015; Tucker et al., 2013). According to Babey, Hastert, Wolstein, and Diamant (2010), obesity is tied to factors affecting poor, along with certain racial and ethnic groups. This includes decreased availability of healthy foods, increased time spent in sedentary activities and limited access to physical activity in schools and neighborhood. Obesity and diabetes disproportionately affect minority populations.

Christie and Channon (2014), suggest that although many people have the intentions to engage in behaviors that guarantee their wellbeing, making changes that facilitate sustainable health might be difficult to uphold. Among the strategies that medical personnel employ to help this category of patients is motivational interviewing (MI). This quality improvement project

focuses on the use of motivational interviewing as a suitable health intervention for poor and food insecure people in overcoming obesity.

Purpose of Project

Decreased knowledge about managing diabetes and difficulty affording healthy foods increases the risk of being obese and overweight among diabetic low-income and food insecure adults ranging in age from 18-70 that receive primary care services at a Northeastern family health center.

Review of the Literature

PubMed and CINAHL databases were utilized to search for the relevant articles. Forty articles from PubMed in total were found using the terms “food insecurity”, “physical activity”, “low-income”, and obesity”. CINAHL database search using the search words obesity, and low-income, intervention and food insecurity, Motivational interviewing, resulted in 998 articles. Refining the search yielded 80 articles, with 9 of the most relevant used for this review.

Motivational Interviewing

Given that Motivational Interviewing (MI) is a person-centered counseling approach that actively engages people and draws on their underlying motivation for change, this project aimed at enhancing participants’ self-motivation for change. As with other chronic conditions, self-management is key for people with type 2 diabetes and obesity. This approach specifically stresses the importance of understanding each person’s unique perspectives and priorities when developing a treatment plan, then uses reflective listening, therapeutic communication, and rapport-building skills to encourage empowerment and behavior change.

According to Manthey, Knowles, Asher, and Wahab (2011), the motivational interviewing (MI) approach was established for monitoring addiction in the early 1980s. According to Markland et al, (2005), MI evolved originally from clinical experience in the treatment of problem drinking, and it was first described by Miller in 1983. Its principles and clinical procedures were further expanded upon by Miller and Rollnick (2012). Since then, MI and adaptations of motivational interviewing have been extended to a wide range of behavior change contexts, including other drugs of misuse .The approach was meant to replace coercive and other confrontational methods that were used to monitor people rehabilitating from drugs. MI has been embraced in various sectors of health to achieve instructional person-centered and active motivation change (Christie & Channon, 2014).

Motivational interviewing is a collaborative effort that acknowledges the client has the right to make changes. The use of dialogue facilitates a two-way exchange of information between the caregiver and the patient. A guiding communication style is employed to enable people to define their situations. Consequently, they can admit that they are facing a problem that prevents positive changes in their lifestyle (Christie & Channon, 2014). In this kind of counseling approach, it is important for the clinician to elicit the individual's point of view on the matter in order to enable them to understand their predicament from the practitioner's perspective. Additionally, in engaging the individual, the goals and values of the intervention are communicated.

Obesity has been known to be associated with high calorie food intake and sedentary life style. Many studies have supported this by showing that people who followed a healthy diet (fruits/vegetables) and physical activity recommendations were successful in reducing their body mass index (BMI) (Ahn et al., 2014; Resnicow et al., 2015; Tucker et al., 2013). Physical activity

is one of the successful interventions that is found in the literature for weight loss. These studies did not indicate how resources such as transportation and healthy food could be made available. For example, according to the study by Tucker et al (2013), a greater proportion of participants in the intervention group who were receiving MI increased the hours of active play per day compared with the control group (61% versus 27%; $p = .004$). However, it did not specifically indicate what type of active play they did. The study by West, Dilillo, Bursac, Gore, and Greene, (2007), aimed at determining if MI incorporated into a behavioral weight management package, helped patients to reduce weight and improve glycemic control for women experiencing obesity and type 2 diabetes. The research found that the individuals in the MI group lost weight significantly at six and 18 months and concluded that MI can be beneficial in conjunction with behavioral treatment for obesity.

Rieger, Steinbeck, Caterson, and Manson, (2009) sought to investigate the efficacy of MI, integrated with a program that monitors an individual's lifestyle for checking weight and improving the psychological functioning of obese adults. Their findings showed that patients had significant improvement in their quality of life, eating behaviors, and other wellbeing benefits such as minimized body dissatisfaction. The implementation of a motivational based approach with a program oriented on modifying the cognitive behavior of an individual, resulted in sustainable weight loss that was comparable to most successful intervention programs. According to the study by Ridge, et al (2012), investigating if the enhancement of glycemic control in type 1 diabetes persists over time as a result of the effects of psychological treatments, a motivationally enhanced therapy (MET) was used together with a cognitive behavioral therapy (CBT). The researchers concluded that the intervention was significant for individuals who

received usual care and also suggested that the current methods employed in psychological treatments might need or incorporate a maintenance session.

It is evident that motivational interviewing is a major improvement in mitigating challenges of obesity and diabetic conditions. Significant results have been found in the use of the intervention technique in conjunction with other approaches such as the cognitive behavioral approach. The implementation of a group motivational interviewing program that involved 40 overweight women resulted in reduced body weight and BMI as compared to the controls group (Christie & Channon, 2014). The application of motivational interviewing in achieving change in a group-based intervention showed that participants lost weight, but some could not maintain the weight lost for a long time (West, Dilillo, Bursac, Gore, & Greene, 2007). According to research findings, MI works better in an intervention that involves a group of people sharing a common problem. The similarity among the people is an enhancement to their participation because they feel they are not alone in a particular struggle. Fundamentally, a group-based approach helps to build motivation and achieve the set targets and can be cost effective for those with limited resources. Behavioral treatments for overweight and obesity can directly affect health behaviors such as improving dietary choices, decreasing sedentary behaviors, and increasing habitual physical activity and exercises. Cognitive-behavioral treatment can be used to help overweight individuals become more assertive in coping with the adverse social stigma of being overweight, enhance their self-esteem, and reduce their dissatisfaction with body image regardless of their weight loss.

Cognitive behavioral approaches

Use of cognitive behavioral approaches can be successfully incorporated with MI to manage patients with obesity and/or diabetes (Ridge, et al., 2012). It focuses on the development

of personal coping strategies that target solving current problems and changing unhelpful patterns in cognitions, behaviors and emotional regulations. This has been noted to have a positive effect on patients in a variety of ways. The intervention's success is characterized by improvements in quality of life, eating habits, and maladaptive cognitions. A study by Rieger, Steinbeck, Caterson, and Manson (2009) showed that the combination of the two approaches resulted in improved lifestyle changes that involved the management of physical activities, and improved social interactions. Christie and Channon (2014) alluded that constructive weight management can be achieved through educational bases that show people the advantages of changing their current lifestyle. Encouraging people to eat, exercise, and seek medical health during the initial stages of complications is vital to prevent use of extreme health interventions (Christie & Channon, 2014). As witnessed in the study carried out by West, et al. (2007), sometimes motivational interviewing does not always result in positive results. The study showed that after some time the trend in weight loss changed negatively among the African-American women by the 18th month of follow-up.

Given that the use of cognitive behavioral approach focusses on the present and not the past, is results- oriented and involves the learning of new skills, this can easily be incorporated with MI. The work of health personnel in administering MI also involves using their knowledge, understanding and skills to facilitate the implementation of the process. Christie and Channon (2014), suggest that it is a collaborative and comprehensive approach where the expertise, skills and proficiency of the practitioner are crucial, but the success of the intervention is determined by the patient. In this case, knowledge about diabetes and weight loss was used to establish a platform where positive change occurs considering the autonomy of the client. Motivational interviewing given by trained primary care providers, registered nurses and dieticians appears

very promising. It involves changing health behavior that included increased intake of fruits and vegetables, increased hours of physical activities and reduced hours of watching television per day. These health habits helped in significantly reducing BMI within a year or two (Resincow et al., 2015; Tucker et al., 2013). As part of MI principles, readiness to change is viewed not as a patient trait, but a fluctuating product of interpersonal interaction. The therapeutic relationship is viewed as a partnership whereby the interventionist does not prescribe specific methods or techniques and patients are responsible for their progress.

Theoretical Framework

The Social Ecological Model (SEM) is an effective framework that helps understand different factors, which influence wellness at varying levels within a specific population, groups, and individuals (Glanz, Rimer & Viswanath, 2008). (Appendix A). The SEM framework variations are used in many research areas including public health. This framework tends to describe the broadening influence layers over individuals' behaviors. This conceptual model is for studying development and implementation, sustainability of obesity prevention program in a rural context. The interventions are a reflection of the particular rural environment, which leads easily to positive outcomes since they are location specific. The SEM intervention demonstrates that there are interrelated factors that affect specific populations and their behaviors. In this case, the SEM framework demonstrates the various multiple influence at different levels while addressing this health problem. Therefore, while integrating this model, the plan will focus on at least five levels of behavior change (Glanz, Rimer & Viswanath, 2008, p. 57). These levels include innate behavior; individual behavior; social, family and community networks; living and working conditions; and broad social, economic and cultural conditions. Alternatively, the plan

will consider the fact that food insecurity and low income remain important in curbing obesity and overweight issues.

The fact that the targeted population is already experiencing low income and food insecurity means that the intervention is likely to work effectively. Through the SEM, the plan started by enhancing individual interventions (Sharma, 2006, p. 45). The model focused on an individual's knowledge, beliefs, attitudes and ultimately behaviors about health. In doing this, the intervention considered the interaction between health professionals and specific individuals. Secondly, the model also focused on the interpersonal group through reinforcement and support among members.

Specific actions are not governed or mandated by the guidelines. Thirdly, the intervention concentrated on the organizational level (Sharma, 2006, p. 55). Here, group members educated each other on both physical activities and nutrition benefits (Glanz, Rimer & Viswanath, 2008, p. 72). The participants were offered various tools, which assisted them to observe their weight. According to Glanz, Rimer and Viswanath, (2008) another important intervention aspect of the SEM framework is by making changes to both the environment and its policies to give the population the best potential access to community resources, healthy foods and to be physically active. This intervention strategy was proposed to the health authorities after the project. This may focus on changes in zoning ordinances, and creating ways for distributing inexpensive vegetables and fruits.

Interventions to prevent being overweight or obese overweight continue to use behavioral-change theoretical frameworks, especially in understanding what causes weight gain. In as much as the relevance of the MI approach is compelling, its appropriateness, especially to the complex

socio-political regulations, social norms, and legislative, and environmental contexts is of significant concern (Sharma, 2006). In this study, participants were either white Hispanics or African American and with this diverse sociocultural backgrounds, MI may not be very appropriate alone. A broader socioenvironmental theory would help increase both social and environmental understanding that maximize different opportunities to minimize healthy lifestyle options, weight gain and creating ‘obesogenic’ microenvironments.

Alternatively, the Social Ecological Model also remains an effective theoretical framework that helps understand different factors, which influence wellness at varying levels within a specific population, groups, and individuals. It also describes various factors, which influence health at population levels.

Project Design and Methods

This DNP project is a quality improvement project involving a systematic process and identified leadership, accountability, and dedicated resources. This project used data and measurable outcomes to determine progress toward relevant, evidence-based benchmarks. The DNP project consisted of an educational intervention focused on low-income patients with type 2 diabetes and obesity in the Northshore who utilized a community clinic. Interventions included group sessions and education on resources in the community for physical activity and diet management.

Setting and Resources

The project’s setting was a community health center, which mostly served minorities and patients of low income. The community health center’s medical director and the Chief Executive

Officer (CEO), both recognized that most of their patients are from minority groups and are at risk for obesity and associated complications and provided support and resources toward the development and implementation of this project. The key stakeholders for the project were, patients, families, primary care providers, and nurses.

Inclusion and Exclusion Criteria

Eligibility criteria included a diagnosis of type 2 diabetes confirmed in the medical record, obesity confirmed in the medical record by BMI greater than or equal to 30, English or Spanish fluency, age between 18 and 70, self-identification as white, African American, or Mexican/Mexican American and being on Masshealth insurance based on low income. The sample size was 13 participants.

Recruitment

A convenience sampling technique was used to recruit eligible participants. Eligible participants were referred to the project by their providers after being informed of the project by the DNP student. During the initial phase of the project, baseline data was collected after an informed consent was signed (Appendix C). Patients were asked to provide a name of any close relative and arrangements were made to either contact the family together with the patient by telephone or to meet with the project lead at the community health center. These arrangements helped to maintain contact given most participants did not have consistent access to telephones. If a participant could not be reached, a family member could help contact them the participant.

During the encounter with the participant, the student explained the rationale of the DNP project and obtained consent. The primary care providers were notified of their patient's participation in the project. A pre- intervention questionnaire was administered to the

participants at the initial phase of the project, and post questionnaires were administered after four months of intervention. The DNP student facilitated monthly group discussions and made weekly follow up telephone calls to the participants and families. The project team met monthly after each discussion group and evaluated the project's progress and quality.

Pre and Post Tests

Questionnaires assessing the patient's knowledge on diabetes, weight management, diet and physical activities were administered at the initial phase of the project and after four months of the educational intervention. Post-intervention questionnaires were identical to pre-intervention questionnaires except for additional questions to assess their general view and benefit of the project. Intervention included group sessions and education on resources in the community for physical activity and diet management. Group sessions were focused on goals setting, behavior change, nutrition, physical activity, challenges and future goals and feedback. The DNP student facilitated group discussions every month and follow patients and families by phone weekly.

Both qualitative and quantitative data were collected in questionnaires in Appendix B. These forms were completed by the participants before the first session and after the last session. Patients participated in group sessions and follow up weekly phone calls to provide additional qualitative data such as adherence to physical activities schedules and recommended diets.

Organizational Analysis of Project Site.

The Health Center consists of three health centers and two high school based clinics. The following services are provided, primary care, dental, Psychiatry, counseling and nutritional services as well as a Suboxone clinic. The primary care clinic is located on a separate floor and divided into two sections. Each section has four providers and two medical assistants. There are two nurses on duty every day and one float nurse who covers both the Suboxone clinic and the

primary care office. There is a conference room where the group meetings were held. The DNP student communicated with all providers whose patients were participating in the project regularly and also with the medical director of the site. Given the selection criteria, these medical providers proposed patients who they deem will benefit from the project and then the DNP student contacted them for consent.

Facilitators and Barriers.

In as much as the social-ecological model tends to represent an all-inclusive approach to implementing and evaluating interventions that target multiple behavioral influences, implementing this model can sometimes be challenging (Glanz, Rimer & Viswanath, 2008, p. 93). In some cases, this model can fail to draw proper conclusions regarding the outcome of the intervention approaches. Additionally, implementing this model in a community that has food insecurity and low-income population can sometimes be misleading. Some of the barriers included getting family members present with patients together.

Arrangement were made with management for late appointments such as late evening or on weekends when family may be present. Time constraints and knowledge deficits by staff were another major barrier given that providers are expected to see about twenty patients daily in this community health center. The DNP student worked with management to address the problems of at risk patients and incorporate MI techniques during the routine training of staff members.

A leaflet with available resources for physical activity was printed and given to participants and then to all at risk patients. Staff members were trained on teachings during routine encounters with patients. Which included assessing for knowledge deficiency on nutrition and diet, listening actively and using therapeutic communication. Lack of finances and reluctance to change from eating some culturally unhealthy diet were also be a big barrier.

The DNP student and staff worked together with case management at the community center and registered dieticians on where to get subsidized assistance for food and educate the family on the importance of a healthy diet. Some of the patients were reluctant to talk about their problem because they do not trust the health system initially, but after the first month of the project, a trusting relationship with the patients was formed and participants communicated very freely. Given that trusting relationship with staff can allow patients to be more open. Facilitators for the intervention include community stakeholders such as specific individuals and groups, different organizations within the community, local government departments, the media and various businesses with resources to help. Also the willingness of the entire staff and management to support the project was one of the major facilitators.

Goals and Objectives

The overall goal of the project was to assess the participants' knowledge about diabetes and associated complications and increase the management skills among obese low income and food insecure individuals. The outcome indicators for this quality improvement project are hemoglobin HbA1c and body mass index (BMI). Also the responses to both the pre and posttest questionnaire also evaluated the success of the project. The target for each participant was HbA1c of less than (6.5%), and a 5 % reduction in BMI during the study period.

According to Delamater (2006) the HbA1c "provides an index of a patient's average blood glucose level during the past 2-3 months and is considered to be the most objective and reliable measure of long-term metabolic control". The BMI is a number calculated from a person's weight and height and it is a fairly reliable indicator of body fatness for most people (Mokdad et al, 2000). With the metric system, the formula for BMI is weight in kilograms

divided by height in meters squared. The formula $\text{weight (kg)} / [\text{height (m)}]^2$. HbA1c shall be measured using the National Glycohemoglobin Standardization Program (NGSP). This program standardizes glycated hemoglobin test results so that values reported by clinical laboratories are comparable to those reported in the two largest clinical trials on the effects of intensive diabetes treatment, namely the Diabetes Control and Complications Trial (DCCT) and United Kingdom Prospective Diabetes Study (UKPDS).

Implementation Plan

The implementation plan was mainly focused on the use of MI which is a person centered counselling approach that actively engages people and draws on their underlying motivation for change. The following plan was used to implement this research translation project:

1. This quality improvement project was carried out within a four months (16 weeks) period (October 2016 to January, 2017). This gave enough time to measure any significant change in the indicators and to evaluate how motivational interviewing has influence the indicators.
2. The main plan for this project was to reduce the vulnerability to diabetes management in obese low income and food insecure individuals using MI.
3. The “Do” for this project was to educate participants on the project plan of action and how to implement it. This included increased physical activities and healthy food choices.
4. The “Study” of the project was to assess the result within the four months’ time frame based on the changes in the indicators. The student also facilitated group discussions every month and follow patients and families at home by phone weekly regarding their

diets and physical activities. This was mainly be to encourage the participants meet with the goals set for the month.

5. The “Act” was to make any changes in the clinic or recommend to entire health system based on results. After the completion of the project educational material were be printed and distributed to patients, families, the department of public health and other healthcare institutions in the area. Clinicians encouraged to incorporate health maintenance reports through which they can track diabetes intervention in this population group.

Cost- Benefit Analysis/Budget

This project was carried out in a community health center and the cost was highly minimized by using most of the resources of the center and benefit was not limited to participants but also to their families. The sample size was thirteen, which was a manageable working size by this DNP student. All the staff who participated in the project were employees of the community health center, hence they were not paid in assisting in the project. All patients were insured and the cost of their visits to the primary care providers and laboratory analysis were covered by their insurance (MassHealth).

There were three group discussions lasting an hour each within the three months study period. Snacks and entertainment estimated at \$100.00 for each group session for a total of \$300.00. At the end of the study, a \$ 25.00 gift card was given to each participant that participated in the study. $25 \times 13 = \$325.00$. One hour meeting was organized at the clinic to discuss the results of the study and what to propose to the clinic staff and management on the management of diabetes in this vulnerable group and about \$ 100.00 was used for the entertainment.

At the initiation of the project, brochures were printed to tell patients their rights and options and also given to the participating family members. 100 total pages were printed at a cost of about \$1.00 /page for a total of \$100.00. After the completion of the project 200 pages of educational material were printed and distributed to patients, families and other healthcare institutions in the area. The cost was \$ 200.00. Miscellaneous costs of about \$ 500.00 for the logistics of organizing various discussions groups and providing transportation to some staff if needed during the project. Total cost: $300.00 + 325.00 + 100.00 + 100.00 + 200.00 + 500.00 = \$1,625.00$.

Using an outreach intervention to engage patients and their families in their care is very important. According to Boren et al, (2009), the benefits associated with education on self-management and lifestyle modification for people with diabetes are positive and outweigh the costs associated with the intervention. From other evidence-based studies, the majority of cases of type 2 diabetes complications could be prevented by the adoption of a healthier lifestyle. Hence if just about two individual's participant in the program lost enough weight to eliminate the diabetes, this shall more than pay for the cost of the program and reduce the burden on MassHealth.

Ethics and Human Subjects Protection

Informed consent and assent procedures and maintenance of confidentiality and privacy was set prior to the start of the project (Appendix C). Written approval from the University of Massachusetts Amherst Institutional Review Board and the Health Center confirming the exempt status of this project was obtained prior to conducting any data procedures or analyses. All the information collected for the project was de- identified using numbers to ensure that patient privacy and confidentiality were properly protected. No data containing any patient's name or

contact information was taken out of the facility. The medical assistants provided the needed information from the medical records to the DNP student.

Results

A total of 28 patients were referred by their primary care providers and interviewed by the DNP student and 13 patients who met the study criteria accepted to participate in this study. Table 1 illustrates the physiological measurements of all the 13 participants pre- intervention.

Data was collected using questionnaires at two time points as illustrated by Table 1 and Table 2. The research question (RQ) to be answered was:

Is there a difference between the pre and post intervention health behaviors (improving dietary choices, decreasing sedentary behaviors, and increasing habitual physical activity and exercises), as measured by the participants' weight, BMI, Hemoglobin A1c and healthy eating habits total score?,

Null Hypothesis: There is no significant difference in the participants' health behaviors, as measured by the weight, BMI, Hemoglobin A1C and health eating habits total score, between the pre-intervention and post-intervention time-points.

Alternative Hypothesis: There is a significant difference in the participants' health behaviors, as measured by the weight, BMI, hemoglobin A1c and health eating habits total score, between the pre-intervention and post-intervention time-points.

Table 1 Physiological Measurements Pre- Intervention

Participant	weight	Height	Body Mass Index BMI	Hemoglobin A1c
1	303	69.5	44.10	7.9
2	281.7	65	46.87	6.8
3	212	64	36.39	8.5
4	203	67	31.79	14.7

5	196	63	34.72	10.6
6	288	67	45.10	7.8
7	183	63	32.41	8.2
8	265	69	39.1	7.9
9	333	68	50.6	10.9
10	195	66.7	30.77	6.4
11	183	65.5	30.0	8.0
12	181	65	30.12	9.4
13	199	67	31.16	7.8

Participants had three group sessions and the DNP student called each participant by telephone weekly to reinforce the group monthly goals on nutrition, physical activities and general compliance with plan of care. Interventions included reflective listening, therapeutic communication, and rapport-building skills to encourage empowerment and behavior change.

There were a total of 13 participants that provided answer to the questionnaires, both pre and post intervention. The attrition rate was zero, signifying no participants dropped out prior to the completion of the study. A reduction was noted in the mean weight and BMI post intervention. While a small increase was noted on the average hemoglobin A1c values as shown in Table 2..

Table 2. Physiological measurements Post-Intervention

Participant	Weight	Height	Body Mass Index BMI	Hemoglobin A1c
1	298	69.5	43.4	7.9
2	270	65	44.9	8.8
3	205	64	35.2	8.2
4	198	67	31.0	14.0
5	199	63	35.25	10.7
6	287	67	44.95	7.5
7	177	63	31.4	7.9
8	245	69	36.18	7.6
9	332	68	50.5	10.6
10	208	66.7	32.82	6.5
11	175	65.5	28.7	7.8
12	177	65	29.5	9.0
13	195	67	30.5	7.6

In order to answer the above question, paired samples t-tests was conducted for each one of the dependent variables (weight, BMI, HbA1c, healthy eating habits total score) based on the independent pre and post motivational interview intervention. Paired samples t-tests is an appropriate test, as all variables are measured on a continuous scale and they are measured twice for the same participant.

Statistical Analysis

The Statistical Package for the Social Sciences (SPSS) software version 22 was utilized to assist in data analysis. Paired sample t-tests was used to determine if the education intervention provided during the study period made a significant difference on the variables of healthy eating habits total score, weight, BMI and HbA1c based on their pre and post intervention values. Descriptive statistics (mean, standard deviation) was computed for all variables. Prior to conducting the paired-samples t-tests, the data were checked for outliers. The significance level was set to 0.05 in this study, so that the risk of finding a relationship between the dependent and independent variable when in fact there is no relationship is set to 5% (Type I error).

Due to the small sample size there might be relationships between the dependent and independent variables, yet the test is not able to detect them (Type II error). In addition, the assumption of normality was assessed using the Shapiro-Wilk test. If one or both assumptions will be found to be invalid, then non-parametric Wilcoxon Signed Rank tests will be applied. Non-parametric tests do not have to meet the assumption of normality and outliers do not need to be removed prior to analysis.

Hypothesis

The project's stated aim was to investigate whether the motivational interview intervention made a difference for the participants in terms of healthy behaviors, as measured by their weight, BMI, HbA1c and total healthy eating habits score. The research question to be answered by the four paired-samples t-tests was:

Is there a difference between the pre and post intervention health behaviors, as measured by the participants' weight, BMI, hemoglobin A1c and health eating habits total score?,

Null Hypothesis: There is no significant difference in the participants' healthy behaviors, as measured by the weight, BMI, Hemoglobin A1c and healthy eating habits total score, between the pre-intervention and post-intervention time-points.

Alternative Hypothesis: There is a significant difference in the participants' healthy behaviors, as measured by the weight, BMI, Hemoglobin A1c and healthy eating habits total score, between the pre-intervention and post-intervention time-points.

Descriptive Statistics

The mean weight pre intervention was 232.52 ($SD = 14.83$), with a minimum weight of 181 and a maximum weight of 333, while the mean weight post intervention was 228.15 ($SD = 14.55$), with a minimum weight of 175 and a maximum weight of 332. Similarly, the mean BMI pre intervention was 37.16 ($SD = 2.00$), with a minimum BMI of 30.00 and a maximum BMI of 50.60, while the mean BMI post intervention was 36.48 ($SD = 1.97$), with a minimum BMI of 28.70 and a maximum BMI of 50.50.

The average blood sugar levels, as measured by Hemoglobin A1c were 8.39 (0.61), with a minimum HbA1c of 6.40 and a maximum HbA1c of 14.70, while the mean HbA1c post intervention was 8.78 ($SD = 0.55$), with a minimum HbA1c of 6.50 and a maximum HbA1c of 14.00. With regards to healthy eating habits, participants reported a mean healthy eating habits

score of 10.62 ($SD = 0.51$), with a minimum healthy eating habit total score of 7 and a maximum healthy eating habit total score of 13, while the mean healthy eating habit total score post intervention was 11.62 ($SD = 0.38$), with a minimum healthy eating habit total score of 9 and a maximum healthy eating habit total score of 14.

Inferential Statistics

The questions posed in this project were:

- a. Is there a difference between the pre and post intervention health behaviors, as measured by the participants' weight, BMI, Hemoglobin A1c and health eating habits total score?,
- b. Null Hypothesis: There is no significant difference in the participants' health behaviors, as measured by the weight, BMI, Hemoglobin A1c and health eating habits total score, between the pre-intervention and post-intervention time-points.
- c. Alternative Hypothesis: There is a significant difference in the participants' health behaviors, as measured by the weight, BMI, hemoglobin A1c and health eating habits total score, between the pre-intervention and post-intervention time-points.

In order to answer the questions, four paired samples t-tests were conducted with the motivational interview intervention as the independent variable and the weight, BMI, Hemoglobin A1c and healthy eating habits total score as the dependent variables. Before the application of the tests two assumptions were tested: outlier presence and normality. The weight, BMI, healthy eating habits total score variables had no outliers, both pre and post intervention.

In contrast, HbA1c variable had an outlier in the pre intervention and one in the post intervention measurements for participant 7. This participant had a blood sugar level as measured by HcA1c higher than expected. With respect to normality, almost all variables failed the

Shapiro-Wilk test for at least one of the categories (pre or post), indicating normality could not be assumed. The variable healthy eating habits total score met the normality assumption both pre, $SW = 0.893$, $df = 13$, $p = 0.106$ and post intervention, $SW = 0.943$, $df = 13$, $p = 0.495$ The results for the normality tests are presented in Table 3.

Table 3. Tests of Normality using the Shapiro Wilk test for the Four Dependent Variables (Weight, BMI, HbA1c, Healthy eating Habits Total Score

Measurement	Pre/Post	Statistic	df	Sig.
Weight	Pre	0.839	13	0.021*
	Post	0.868	13	0.050*
BMI	Pre	0.867	13	0.048*
	Post	0.880	13	0.071
HbA1c	Pre	0.817	13	0.011*
	Post	0.814	13	0.010*
Healthy Eating Habits Total Score	Pre	0.893	13	0.106
	Post	0.943	13	0.495

Note. * Statistically significant at the 0.05 level

Four independent samples t-tests were employed to determine if the motivational interview intervention had any effect on the weight, BMI, HbA1c and healthy eating habits total score for the thirteen participants enrolled in the study. There was no statistically significant difference in terms of mean weight between the pre and post intervention time points, $t = 2.058$, $df = 12$, $p = 0.062$. The mean weight difference was 4.36 ($SD = 7.64$), with a 95% CI [-0.26 - 8.98]. The effect size was strong, Cohen's $d = 0.807$. . There was no statistically significant difference in terms of mean BMI between the pre and post intervention time points, $t = 2.058$, $df = 12$, $p = 0.062$.

The mean BMI difference was 0.68 ($SD = 1.19$), with a 95% CI $[-0.04 - 1.40]$. The effect size was strong, Cohen's $d = 0.807$. There was no statistically significant difference in terms of mean HbA1c between the pre and post intervention time points, $t = 0.339$, $df = 12$, $p = 0.741$. The mean HbA1c difference was 0.06 ($SD = 0.66$), with a 95% CI $[-0.33-0.46]$. The effect size was very weak, Cohen's $d = 0.133$. Lastly, there was no statistically significant difference in terms of mean HbA1c .Healthy eating habits total score between the pre and post intervention time points, $t = -1.927$, $df = 12$, $p = 0.078$. The mean healthy eating habits total score difference was -1.00 ($SD = 1.87$), with a 95% CI $[-2.13- 0.13]$. The effect size was strong, Cohen's $d = 0.757$. Overall, the null hypothesis could not be rejected and the motivational interview intervention did not have an effect on the participants' health behaviors, as measured by the weight, BMI, Hemoglobin A1c and healthy eating habits total score, between the pre-intervention and post-intervention time-points. The results are presented in Table 4.

Table 4. Comparison between the Pre and Post Intervention Mean Values for the Four Dependent Variables (Weight, BMI, HbA1c, Healthy eating Habits Total Score) using Paired Samples t-tests (n = 13)

Measurement	Mean	SD	95% Confidence Interval		t	Sig.
			Lower	Upper		
Weight	4.362	7.641	-0.256	8.979	0.258	0.062*
BMI	0.679	1.190	-0.040	1.398	2.058	0.062*
HbA1c	0.062	0.655	-0.334	0.457	0.339	.741
Healthy Eating Habits Total Score	-1.000	1.871	-2.131	0.131	-1.927	0.078*

Note. * Statistically significant at the 0.1 level

The individual questions that formed the basis for the healthy eating habits total score were analyzed using the Wilcoxon signed ranks test, as the answers were categorical in nature. The results revealed that while there was no statistically significant difference in terms of fast food eating, location of food shopping and daily meals between pre and post intervention answers, there was a statistically significant difference with regards to fruits and vegetable eating, $Z = -2.233$, $p = 0.026$. The effect size was large, $r = 0.438$. Thus the intervention seemed to prompt participants to eat more servings of fruit and vegetables. The results are presented in Table 5.

Table 5. Comparison between the Pre and Post Intervention Mean Values for the Four Questions Included in the Healthy Eating Habits Total Score using Wilcoxon Signed Rank Sum Tests (n = 13)

Measurements	Z	Sig.
Fast Food Eating	-1.732b	0.083
Fruits and Vegetables Eating	-2.233b	0.026*
Location of Food Shopping	-1.081b	0.279
Daily Meals	-1.100a	0.271

Note. a Based on positive ranks. b Based on negative ranks * Statistically significant at the 0.05 level

Sensitivity Analysis

The assumptions necessary to conduct the paired-samples t-tests were mostly not met, with the exception of the healthy eating behaviors total score. This is because weight and BMI did not meet assumption of normality and HbA1c had an outlier. As such, a sensitivity analysis

was conducted for the remaining three paired-samples t-tests (weight, BMI, HbA1c) to determine if the outliers and the deviation from normality affected the parametric tests results. Three Wilcoxon signed rank tests were employed, as they are the non-parametric alternative to the parametric paired samples t-tests.

There was a statistically significant difference in the mean rank weight post intervention versus the mean rank pre intervention, $Z = -2.133$, $p = 0.033$. The effect size was large, $r = 0.418$. The MI intervention seemed to reduce the weight for the participants post intervention versus pre intervention. Similarly, there was a statistically significant difference in the mean rank BMI post intervention versus the mean rank pre intervention, $Z = -2.132$, $p = 0.033$. The effect size was large, $r = 0.418$. The MI intervention seemed to reduce the BMI for the participants post intervention versus pre intervention. In contrast, there was no statistically significant difference in the mean rank HbA1c post intervention versus the mean rank pre intervention, $Z = -1.750$, $p = 0.080$. The effect size was medium, $r = 0.372$. The MI intervention seemed to have no effect on the HbA1c levels for the participants post intervention versus pre intervention. The results are presented in Table 6.

Table 6. Comparison between the Pre and Post Intervention Mean Values for the Four Dependent Variables (Weight, BMI, HbA1c, Healthy Eating Habits Total Score) using Wilcoxon Signed Rank Sum Tests (n = 13)

Measurements	Z	Sig.
Weight	-2.133a	0.033*

BMI	-2.132a	0.033*
HbA1c	-1.899a	0.058

Healthy Eating Habits		
Total Score	-1.750b	0.080

Note. a Based on positive ranks. b Based on negative ranks

* Statistically significant at the 0.05 level

The results indicate that the data is indeed sensitive to the departures from normality and the presence of outliers for the weight and BMI variables. Based on the sensitivity analysis results, the intervention had an effect on the weight and BMI scores, but not on the HbA1c.

Most of the participants were very engaged in the discussions especially when they became comfortable sharing with one another. Newly diagnosed diabetic participants asked questions such as what other could have done year ago when they were diagnosed, important of being compliance with medications and many other interactive questions. Participants who were just recently diagnosed with diabetes and people who have been living with diabetes for more than 15 years.

Most of the participants were very pleased to have participated in the project and many expressed positive reactions. Some stated that they were reminded of healthy behaviors and also encountered other people struggling with the same problem which was an encouragement and motivation to follow physician's recommendations. Other participants noted that it was their first time they were able to discussed about their weight and diet and have somebody patiently listen to them. This empowered them and was a big motivation to continue healthy life choices. The group session was also a re-ignitement of knowledge and motivation to some participants such as

participant 7 who stated that “This has re-ignite my knowledge and motivation since at times I will just give up and remain indoors and eat whatever I want to eat, I am grateful I attended this group” The importance of reading food labels was also recognized by many participants as a new and important habit, and during the project many increased their shopping time mainly reading food labels. Most participants also stated that their eating habits improved during the project, for example participant 3 stated that “I have been eating more fruits and vegetables since the beginning of the group and I surely will continue “. It was generally a great experience noted by most of the participants and all were willing to participate in any future project if invited.

Discussion

In the United States, more than a third of adults are obese, with precise rates varying by region and state (Centers for Disease Control [CDC], 2012). Obesity risk related to food quality remains high even when food insecure individuals or households participate in formal emergency and supplementary food assistance programs, or informally obtain supplemental sources of food (Walker & Kawachi, 2012). Obesity in adulthood is an underlying cause, environmental trigger, or exacerbating factor for a litany of clinical sequelae including: cardiometabolic disease, type 2 diabetes, cancer, hypertension, dyslipidemia, stroke, liver and gallbladder disease, sleep apnea and respiratory disease, osteoarthritis, gynecological problems, and endocrine disorders (CDC, 2010).

This educational intervention focused on linkages, efficiencies, and provider and client expectations in addressing outcome improvement. Data collected was used to provide feedback to the facility to assure that goals are accomplished and they are concurrent with improved outcomes. Obesity and diabetes appears to affect disproportionately the minority segment of our population. Maintaining and improving the quality of the nation's health care system is an

important part of keeping people safe especially the most vulnerable. As illustrated by this study, this can be achieved by using our local community health centers, other community organizations could also be part of this struggle at different levels.

There is limited use of motivational interviewing (MI) to combat the risk of obesity and obesity in low-income, and food insecure households by reducing type 2 diabetes complications and other cardiovascular diseases. Providers and staff were educated about the importance of MI and also trained on MI techniques by the DNP student and the Medical Director. This included educating patients on healthy diet such as fruits and vegetables and locations of healthy food retail stores in the community.

This DNP project illustrates the positive effect of having support groups where participants could share experiences and support one another with similar problems. Participants in this project were noted to have improved health outcomes noted from decreased BMI, weight, and ability in the improvement to make healthy life choices were appreciated. These positive outcomes though with some limitations, and improvement opportunities, indicate that MI and group sessions are a good alternative that primary care providers can adapt to provide necessary and accurate information on diabetes, obesity and associated complications. After interviewing participants a plan was developed which was unique to each participant's perspective and priorities. During the group session and most specifically during the weekly phone calls, the DNP student used reflective listening, therapeutic communication, and rapport-building to encourage and empower specific behavior changes.

Previous studies have illustrated that motivational interviewing is more effective when it involves a group of people sharing a common problem. The similarity among the participants such as being overweight, diabetic and low income was an enhancement to their participation because

they felt they were not alone in a particular struggle. As stated by Kosaka et al, (2005), lifestyle intervention aimed at achieving ideal body weight in people with impaired glucose tolerance is effective and can be conducted in an outpatient clinic setting.

The project also reveals a linear relationship between BMI values and incidence of diabetes and associated complications. It revealed that the participants who were living with family acknowledged a great support from them during the entire study period and some even followed what the participants were doing. The importance of family as a health unit where members help each other to accomplish their health goals especially concerning diabetes and obesity is worth noting.

Engaging close family usually improves treatment compliance. Familial social support has been well demonstrated to be a key factor for promoting and sustaining health behavior change by many studies. According to Gruber and Haldeman, (2009) spousal support has been identified as an important factor influencing weight reduction among obese women with type 2 diabetes. They also reported familial support to be effective in producing health-promoting behaviors among patients with cardiovascular disease and for chronically ill family members achieving physical activity guidelines and practicing better dietary behaviors. The DNP student noted that on weekly telephone calls family members usually responded initially, and will then remind the participants. Most of the family members were aware of the study and will encourage the participant about the set goals. Finally, family support consistently correlates positively with physical activity level.

The Social Ecological Model theoretical framework provided a vital structure for understanding and researching the health problem and its intervention in the specified

population. It is important in the understanding of the sustainability of obesity prevention program in this vulnerable population. Another important point that demonstrates strength and consistency throughout the conceptual framework is the relative attention that is being paid especially on the environmental determinants. Some of which included the lack of adequate transportation to food stores, clinics and safe places to exercise.

Apart from the individual-based determinants, the conceptual framework used new models for promoting, understanding, and prevention of obesity and associated complications. This framework also uses intervention approaches at different levels, which tends to provide different way to help in modifying unhealthy lifestyle behaviors in the specific population. By establishing a broad perspective for obesity interventions and preventions, the framework tends to support the establishment of effective prevention approaches (obesity) as practiced by national and local authorities. This perspective remains important in the maximizing usage of high knowledge levels in helping the policy makers during the investment of resources during long-term obesity prevention program.

The Social Ecological Model conceptual framework lacked specificity about the most important hypothesized influences. Hence healthcare providers need to identify individual behaviors which at times may be difficult and time consuming. The framework does not clearly identify how specific variables are used in the interventions such as not providing clearly stated variables.

Limitations.

This project had a sample size of only 13 participants, which was a limitation of the study; hence the results of this study may not be easily generalized. Also participant's health eating

habit scores were based on the self-report by the patient, which may not be one hundred percent reliable hence affecting the accuracy of the results. The intervention period was for only four months and some of the variables such as HbA1c may have had a significant change if the duration were longer. Also due to the short duration of the study, it is unknown if the positive results of increased fruit and vegetable consumption as well as improved weight and BMI results will be sustained over time.

Conclusion

Obesity and overweight continue to be a growing problem worldwide and most especially within the low income population. In fact, overweight and obesity are major causes of chronic diseases, especially within populations that have unequal socioeconomic distribution. Low-income households are at a significant disadvantage when it comes to nutrition and physical exercise. Not only are there access related issues of where to find affordable, fresh produce, and other healthy foods, but there are safety issues such as walking alone in unsecure neighborhood for those who live in urban settings, making it difficult to find avenues for physical activity.

Based on the review of literature, availability of affordable healthy food, time and resources for physical exercise, as well as motivation to improve body composition and function were important factors to overcome obesity. Future studies on this subject with a larger sample size and a longer intervention period would be helpful to produce results which could be more generalized. Based on the sensitivity analysis results, this intervention had an effect on the weight and BMI scores, but not on the HbA1c and healthy eating habits total score. Despite the results, the effects of motivational interviewing may have lasting effects on most of the participants and the results may be more evident in the long run.

These interventions can be easily implemented in this community health center and others in the county given that more than 75 % of patients are minorities and probably food insecure. As providers and potential policymakers, we have the responsibility to educate ourselves on food insecurity, obesity related issues and various interventions that facilitate access to healthy meals and promote healthy food choices.

The results of this project will be distributed in various community health settings. A summary of the project will be distributed to all community health centers in the Northshore region in the form of a brochure. The dissemination of the results will hopefully help to decrease obesity and diabetes prevalence and associated complications.

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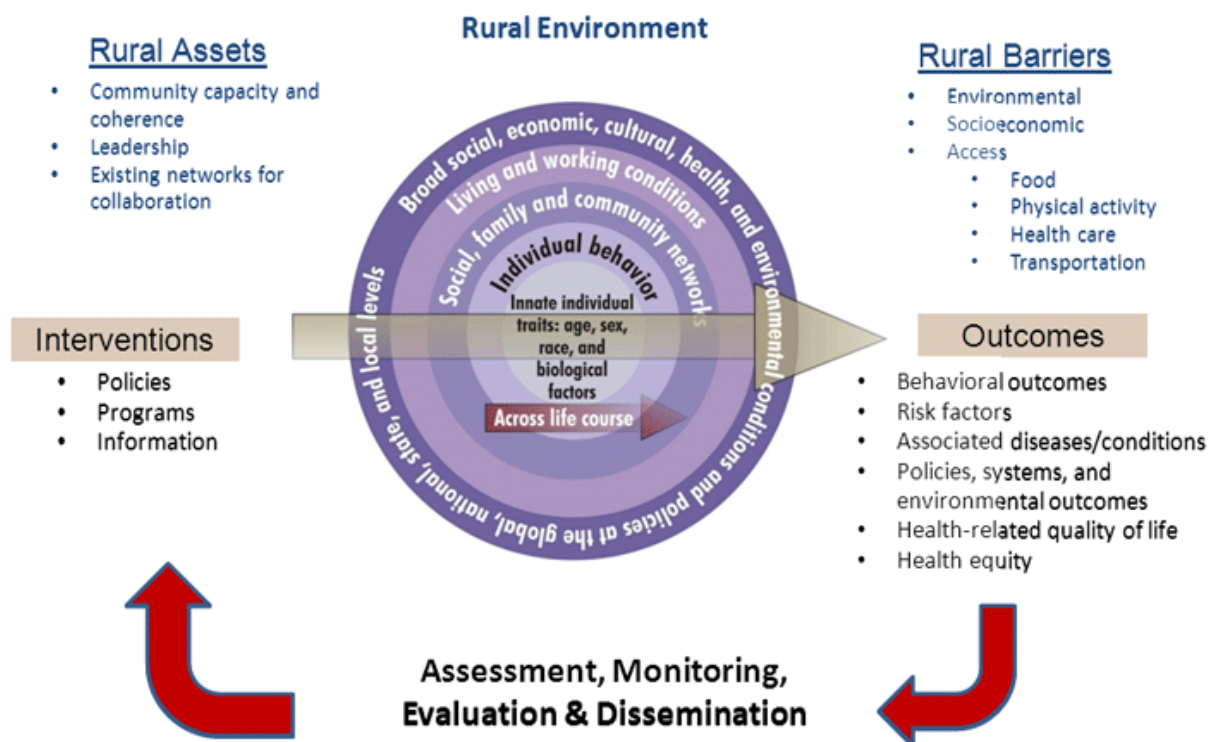
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Appendix A.

Conceptual Model for Studying Development, Implementation and Sustainability of Obesity Prevention Programs in a Rural Context



Source: Phase I Report: Recommendations for the Framework and Format of Healthy People 2020 The Secretary's Advisory Committee on National Health Promotion and Disease Prevention Objectives for 2020, U.S. Department of Health and Human Services, October 28, 2008

Appendix B**Questionnaire**

1. What is your Age? _____
2. What is your height? _____
3. What is your weight? _____
4. Do you know your BMI? -----

5. How would you rate your general health?

- A. Excellent
- B. Good
- C. Fair
- D. Poor

6. Has a medical provider ever talked to you about weight loss?

- A. Yes
- B. No
- C. Don't know/Not sure
- D. Refused

7. How often do you shop for food?

- A. 1 time week or more
- B. Every other week
- C. 1 or 2 times /month
- D. Less than 1 time a month
- E. Other (specify)**
- F. Never

8. Where do you purchase the majority of the food your family eats?

- A. Major grocery store
- B. Convenient store
- C. Farmers Market
- D. Other (**SPECIFY**) _____

9. How often do you buy food from a convenient store?

- A. Daily
- B. 2-3 times a week

- C. Weekly
- D. Never

10 Which of the following is a hindrance for you buying food that you and family needs?

- A. No problem getting healthy food
- B. Household bills
- C. Medical bills
- D. Transportation

E. Others.....

11. Which of the following food assistant programs do you or members of your household currently participate in?

- A. Food stamps
- B. Food bank/food pantry
- C. WIC
- D. Shelter that provides food
- E. School lunch and/or breakfast program
- F. Summer food service program
- G. Nutrition program for the elderly
- H. Other _____
- I. None

12. How many days does the food you get from the assistance program usually feed your family?

- A. 1-3 days
- B. 4-7 days
- C. more than one week
- D. more than 2 weeks
- E. more than 3 weeks
- F. more than 4 weeks
- G. more than 5 weeks
- H. Not applicable

13. Which of the following problems, if any, did you have in using the food assistance program?

- A. The application process was hard
- B. The food provided was not of good quality and/or variety
- C. It was hard to get the food assistant program named: _____
- D. You were treated poorly when applying for or using assistance
- E. Language barrier

14. What is the name of the store where you buy most of the food that you make at home?

- A. Market Basket
- B. Shaw's
- C. Stop and shop
- D. Walmart
- E. Farmers Market (**Specify**) _____
- F. Other _____

15. Why do you prefer this store?

- A. Low prices
- B. Good selection/quality
- C. It's close to home
- D. It's on the way to/from somewhere you usually go
- E. It's near the bus stop or other public transportation
- F. They treat you well there
- G. They accept food stamps/WIC vouchers/other method of payment
- H. Other _____

16. What is your mode of transportation?

- A. Bus
- B. Own vehicle
- C. You pay someone \$_____ to drive you
- D. You ride free in someone else's vehicle
- E. Bike
- F. Walk
- G. Other _____

17. How often do you eat fruit or vegetables?

- A. Once a week or less
- B. 2-4 times a week
- C. Once a day
- D. 2-4 times a day
- E. 5 or more times a day

18. Which of the following problems, if any, stops you from eating the fruits and vegetables you want?

- A. Prices are too expensive
- B. Stores are too hard to get to
- C. Fruits and vegetables are poor quality where you shop
- D. Fruits and vegetables you want are unavailable where you shop
- E. Not enough time to shop for fruits and vegetables
- F. Not enough time to prepare fruits and vegetables
- G. No kitchen equipment to prepare/store fruit and vegetables
- H. You don't like fruits and vegetables

19. How many meals a do you eat?

- A. One meal
- B. Two meals
- C. Three meals
- D. Four meals
- E. Five meals
- F. Six meals or more (specify) _____

20. Which of the following makes you gain weight?

- A. Sleep problems
- B. Eating (junk food)
- C. Having children
- D. Not exercising

21. What health conditions can you develop if you are overweight and/or obese?

- A. Headaches
- B. Nosebleeds
- C. Diarrhea
- D. Diabetes

22. How can you lower your chances of becoming obese?

- A. Medications
- B. Eating one to two meals a day
- C. Eating more fruits and vegetables
- D. Drinking juice instead of soda

23. Where have you heard messages about achieving a healthy weight?

- A. Television
- B. Newspaper
- C. Computer
- D. Books/magazines
- E. Radio
- F. Other (specify) _____

24. What was your household or family income? (Include your total family income from all sources and from all the people who live with you)

- A. Under 10,000
- B. 10,000 – 20,000
- C. 20,000 – 30,000
- D. 30,000 – 40,000
- E. Above 40, 0000

25. What is your highest level of education?

- A. 8th grade or less
- B. Some high school
- C. High School graduate or GED
- D. Trade school
- E. Some college
- F. College graduate or higher

26. How would you describe your employment status?

- A. Retired
- B. Employed full-time (35 hours or more per week)
- C. Employed part-time (1-34 hours per week)
- D. Self-employed
- E. Unemployed
- F. Disabled

27. Do you currently take medications? Y/N if yes how often?

- A. Always
- B. Most often
- C. Sometimes
- D. Rarely
- E. Never

28. Month and year of last general eye exam or scheduled date?**29. How often should you see an eye doctor?**

- A. Every month
- B. Every six months
- C. yearly
- D. Every two years
- E. Never

30. What is a normal fasting blood glucose or blood sugar?

- A. 70-130 mg/dL,

B. 3.9- 7.2 mmol/L

C. A number greater than 130mmol/L

D. No ideal

31. Most recent HbgA1C: _____ Date: _____

32. What is a normal HbA1c?

33. How often do you exercise?

34. How many times per week should someone with diabetes exercise?"

35. What are the signs and symptoms of high blood sugar?

(Frequent urination, thirst, hunger, vision effects, and headache)

36. What are the signs and symptoms of low blood sugar?

(Hunger, anxiety, heart effects, shaking, sweating, fatigue Stomachache, vision problem, headache)

37. How do you treat low blood sugar?

(Drink soda, juice, or milk; eat candy or sugar; eat something)

38. How often should a person with diabetes check his or her feet?

39. Why are foot exams important in someone with diabetes?

(Circulation, feeling, wound, infection, ulcer, amputation, affects feet, trim toenails)

40. Why is it important to see an eye doctor?

(Blindness, bleeding in eye, retinopathy, glaucoma Nonspecific: e.g., affects eyes, acuity, cataracts)

42. What are some long-term complications of uncontrolled diabetes?

(Amputation, stroke, coma, loss of feeling, heart, vision, circulation problems Teeth, arms, lung, or mind problems)

43. (Post). Has this project been helpful to you?

Appendix C

Consent Form for Participation in a Research Study

University of Massachusetts Amherst

Researcher(s): Cornelius N Bela

Study Title:

Motivational Interviewing for Low Income People to Help Manage Weight

1. WHAT IS THIS FORM?

This form is called a Consent Form. It will give you information about the study so you can make an informed decision about participation in this research.

This consent form will give you the information you will need to understand why this study is being done and why you are being invited to participate. It will also describe what you will need to do to participate and any known risks, inconveniences or discomforts that you may have while participating. We encourage you to take some time to think this over and ask questions now and at any other time. If you decide to participate, you will be asked to sign this form and you will be given a copy for your records.

2. WHO IS ELIGIBLE TO PARTICIPATE?

Eligibility criteria shall include a diagnosis of type 2 diabetes confirmed in the medical record, obesity confirmed in the medical record by BMI greater than or equal to 30, English or Spanish fluency, age between 18 and 70, self-identification as white, African American, or Mexican/Mexican American and on Masshealth based on low income

3. WHAT IS THE PURPOSE OF THIS STUDY?

The overall goal of the project is to reduce the vulnerability to diabetes and associated complications and increase the management skills among obese low income and food insecure individuals.

4. WHERE WILL THE STUDY TAKE PLACE AND HOW LONG WILL IT LAST?

This study shall take place at Salem Family Health Center and it is expected to be completed within a three month period.

5. WHAT WILL I BE ASKED TO DO?

If you volunteer to participate in this study, you will be asked to do the following things:

Participate in a survey to gather information about your experiences with food access, food availability and the impact of nutrition on your health, personal behaviors and perceptions toward dietary nutrition. Also participate in three focus groups within the duration of the study.

6. WHAT ARE MY BENEFITS OF BEING IN THIS STUDY?

As a result of sharing your experiences with the researcher, recommendations for improving the access and availability of healthy food options to food insecure communities may be made. These recommendations will address the needs that interviewees, such as yourself, have identified. Therefore, the results of this survey may potentially improve your access to resources in your community.

7. WHAT ARE MY RISKS OF BEING IN THIS STUDY?

We believe there are no known risks associated with this research study; however, a possible inconvenience may be the time it takes to complete the study and you may also feel some discomfort speaking about your experiences with managing your diet and taking care of yourself. If you are uncomfortable with any of the questions, you can skip questions and stop participating at any time.

8. HOW WILL MY PERSONAL INFORMATION BE PROTECTED?

The information you share will only be used in this study. Once the information is collected and stored, all information that can identify you will be removed. Your name will not be associated with your responses and will be identified only by an assigned code number. The information you give will be stored electronically on password-protected computers. All electronic file containing identifiable information will be password protected also. Once data has been collected and analyzed from the survey, the information will be destroyed after a three year period. After three years, all notes and electronic transcripts will be permanently deleted. At the conclusion of this study, the researchers may publish their findings. Information will be presented in summary format and you will not be identified in any publications or presentations.

Please be advised that although the researchers will take every precaution to maintain confidentiality of the data, the nature of focus groups prevents the researchers from guaranteeing confidentiality. The researchers would like to remind participants to respect the privacy of your fellow participants and not repeat what is said in the focus group to others.

9. WILL I RECEIVE ANY PAYMENT FOR TAKING PART IN THE STUDY?

All participants shall receive a gift certificate of \$25.00 at the end of the study.

10. WHAT IF I HAVE QUESTIONS?

Take as long as you like before you make a decision. We will be happy to answer any question you have about this study. If you have further questions about this project or if you have a research-related problem, you may contact the researcher Cornelius Bela at 781 267 0360. If you have any questions concerning your rights as a research subject, you may contact the University of Massachusetts Amherst Human Research Protection Office (HRPO) at (413) 545-3428 or humansubjects@ora.umass.edu.

11. CAN I STOP BEING IN THE STUDY?

You do not have to be in this study if you do not want to. If you agree to be in the study, but later change your mind, you may drop out at any time. There are no penalties or consequences of any kind if you decide that you do not want to participate.

12. WHAT IF I AM INJURED?

The University of Massachusetts does not have a program for compensating subjects for injury or complications related to human subjects research, but the study personnel will assist you in getting treatment.

13. SUBJECT STATEMENT OF VOLUNTARY CONSENT

When signing this form I am agreeing to voluntarily enter this study. I have had a chance to read this consent form, and it was explained to me in a language which I use and understand. I have had the opportunity to ask questions and have received satisfactory answers. I understand that I can withdraw at any time. A copy of this signed Informed Consent Form has been given to me.

☐ **I agree to maintain the confidentiality of the information discussed by all participants and researchers during the focus group session.**

If you cannot agree to the above stipulation please see the researcher(s) as you may be ineligible to participate in this study.

Participant Signature:

Print Name:

Date:

By signing below I indicate that the participant has read and, to the best of my knowledge, understands the details contained in this document and has been given a copy.

Signature of Person

Print Name:

Date:

Obtaining Consent

Appendix D

Group Discussion.

Session	Topic	Facilitator
Session 1	General introduction. Review of diabetes and obesity complications. General nutrition and physical activity principles Food and activity diary Motivational Interviewing	DNP Student
Session 2	Challenges and struggles Evaluate what is going on well. Ways of meeting goals Food related behaviors	DNP Student
Session 3	General review Feedback Goals are how to maintain them. General discussion.	DNP Student

